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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,068	07/10/2003	Yeong-Taeg Kim	SAM2.PAU.20	3772

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EXAMINER	
HARRISON, CHANTE E	
ART UNIT	PAPER NUMBER
2628	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/617,068	KIM, YEONG-TAEG	
	Examiner	Art Unit	
	Chante Harrison	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-30,32,33,36 and 39* is/are rejected.

7)☒ Claim(s) *31,34,35,37 and 38* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to communications: Amendment, filed on 1/8/07. This action is made FINAL.

2. Claims 22-39 are pending in the case. Claims 22 and 39 are independent claims. Claim 25 has been amended.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 22-30, 31, 32, 33, 36, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kusakabe et al, US 2005/0031223 A1, 2/2005.

As per independent claim 22, Kusakabe discloses a noise detector (Fig. 1 "104") that detects areas of noise in a pixel window based on the pixel information (i.e. evaluating pixel values to detect visibility of blur regions) (pp. 6, Para 89-93; pp. 7, Para 107), the pixel window including a set of pixels from the input image pixels (pp. 2, Para 16; Fig.

6B); an image processor (pp. 2, Para 15) that processes window pixels to generate pixels with reduced noise (Fig. 11); and a combiner (i.e. output means) (pp. 2, Para 15) that selects the processed pixels with reduced noise in the detected noise areas, and generates an output image comprising; (i) the selected processed pixels with reduced noise, and (ii) the remaining window pixels from the input image (i.e. "noisy" pixels are given substitute values based on a process to reduce noise; and the output image is a combination of the non-noise pixels and the substituted pixel values with noise suppressed) (pp. 7, Para 113; pp. 8, Para 122-124; Fig. 11); whereby the output image includes portions of the input image where noise artifacts were not detected (i.e. image includes non noise region pixels 601) (Para 113; Fig. 11A), and portions of the processed image corresponding to areas in the input image where noise artifacts were detected (i.e. image includes noise region pixels 600) (Para 113; Fig. 11A), such that the output image is an enhanced version of the input image (p. 1, Para 14; p. 8, Para 132, Fig. 1A "104") with noise artifacts substantially reduced (p. 4, Para 61).

Kusakabe fails to disclose ringing artifacts.

It would have been obvious to one of skill in the art to include ringing artifacts with the method of Kusakabe because Kusakabe teaches evaluating pixel values to detect visibility of blur regions, where blur regions are example of image deterioration or ringing artifacts due to encoding or decoding of an image.

One of skill in the art would have been motivated to include ringing artifacts with the method of Kusakabe for the benefit of reducing deterioration of image information.

As per dependent claim 23, Kusakabe discloses the ringing-artifact detector comprises a pattern detection function that detects ringing pattern-like features (p. 5, Para 85) indicating the areas of ringing in the pixel window as a function of gradation level difference between one or more pixels therein (i.e. a luminance/gradation difference between pixels is used as a parameter for determining noise) (pp. 7, Para 109; pp. 8, Para 127; Fig. 13).

As per dependent claim 24, Kusakabe discloses the ringing artifact detector determines the color difference between a pixel and that of neighboring pixels (pp. 9, Para 137), and detects if the color difference is within a selected threshold, indicating ringing-like artifacts proximate that pixel position in the window (pp. 11, Para 169).

Kusakabe fails to disclose determining gradation level difference.

It would have been obvious to one of skill in the art to include determining gradation level difference with the method of Kusakabe because Kusakabe teaches the image information compared may alternatively to luminance and color difference components.

One of skill in the art would have been motivated to include determining gradation level difference for the benefit of processing image information including gradation level components.

As per dependent claim 25, Kusakabe disclose the image processor included a low pass filter that applies low pass filtering to the image pixels to generate pixel with reduce ringing artifacts (pp. 1, Para 8; pp. 8, Para 132; Para 85-87; Fig. 7).

As per dependent claim 26, Kusakabe discloses the image processor includes a smoother (i.e. LPF) that reduces ringing artifacts (pp. 1, Para 14; pp. 4, Para 61; Fig. 1A "104").

As per dependent claim 27, Kusakabe discloses a variance detector that determines local variance of each pixel in the window with respect to pixels (pp. 7, Para 107-109), wherein the local variances indicate presence of noisy areas in the image (p. 5, Para 87); a signal detector that based on the local variances, detects if the location of the window is proximate a noisy area in the input image (i.e. the threshold values of the luminance parameters are used to detect noise/signal when comparing pixels within a window; such that the window size is adjusted during the noise suppression process to sufficiently reduce noise) (pp. 7, Para 114; pp. 8, Para 120); such that the combiner further selects pixels with reduced ringing artifacts from the processed pixel (pp. 8, Para 122-124), based on the detected ringing artifact areas and the detected window location information (pp. 2, Para 16), and generates that enhanced output image comprising; (i) the selected pixels with reduced ringing artifacts (i.e. noise removal process visually reduces noise) (p. 4, Para 61), and (ii) the remaining window pixels from the input image (pp. 7, Para 113; Fig. 11A).

Kusakabe fails to disclose determining a variance to neighboring pixels.

It would have been obvious to one of skill in the art to include determining the variance between neighboring pixels with the method of Kusakabe because Kusakabe teaches evaluating a pixel of interest and an arbitrary pixel, where an arbitrary pixel within the same image is a neighboring pixel.

One of skill in the art would have been motivated to include determining the variance between neighboring pixels with the method of Kusakabe for the benefit of determining the difference between pixels to aid in the suppression of noise/image deterioration between pixels.

As per dependent claim 28, Kusakabe disclose the combiner pixels with reduced ringing artifacts from the processed pixels in the detected ringing artifact areas, based on the window location information (pp. 8, Para 122-124).

As per dependent claim 29, Kusakabe discloses the combiner selects pixels with reduced ringing artifacts form the processed pixels in the detected ringing artifact areas, corresponding to substantially in noisy input image locations (pp. 8, Para 122-124).

As per dependent claim 30, Kusakabe discloses the input image comprises a decompressed image (i.e. input image having an enlargement ratio corresponds to a decompressed image) (pp. 12, Para 182), such that said ringing artifacts were

generated by image compression and/or decompression (i.e. deterioration results from encoding process for JPEG, e.g. compression of digital image) (p. 5, Para 5).

As per dependent claim 31, discloses the larger the gradation level differences between a pixel and its neighboring pixels, then the lower the ringing artifact effect.

As per dependent claim 32, discloses the variance detector determines the local deviation in the image (pp. 7, Para 107-109).

As per dependent claim 33, the rationale as applied in the rejection of claim 27 applies herein.

As per dependent claim 36, Kusakabe discloses a pattern detection function that detects ringing pattern-like features in the window (p. 5, Para 85). The rationale as applied in the rejection of claims 22 and 27 apply herein.

As per independent claim 39, Kusakabe discloses a device (Fig. 1 & 3) for implementing the method of claim 22. The rationale as applied in the rejection of claims 27 and 36 apply herein.

Claims 31, 34, 35, 37 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

1. Applicant's arguments filed 1/8/07 have been fully considered but they are not persuasive.

Applicant argues (pp. 14) Kusakabe fails to disclose "a ringing-artifact detector that detects areas of ringing artifacts....".

In response, Kusakabe teaches noise detection, where image edges are processed using a LPF (Para 85-87; Fig. 7). Additionally, Kusakabe teaches reducing the visual artifacts, e.g. blur, by using set parameters that assure a high noise removal effect when it is determined that the output resolution will introduce blur (Para 93). Therefore, it is obvious that Kusakabe teaches the detection of ringing artifacts as he teaches processing edges to determine and reduce blur.

Applicant argues (pp. 14-15, 16-17) Kusakabe does not perform ringing artifact detection in a pixel window.

In response, Kusakabe teaches use of a pixel window (Fig. 7B) to determine the image state when the LPF (i.e. low pass filter) process is executed. Therefore, Kusakabe teaches determining ringing artifact detection in a pixel window.

Applicant argues (pp. 15-16, 17, 19) Kusakabe fails to disclose an image processor that processes window pixels to generate pixel with reduced ringing artifacts.

In response, Kusakabe teaches an image processor (pp. 2, Para 15). Kusakabe teaches use of a pixel window (Fig. 7B; 11A & B) to determine the image state when the LPF process is executed. Additionally, Kusakabe teaches reducing the visual artifacts, e.g. blur, by using set parameters that assure a high noise removal effect when it is determined that the output resolution will introduce blur (p. 6, Para 93). Therefore, Kusakabe teaches use of an image processor that determines ringing artifact detection in a pixel window.

Applicant argues (pp. 16, 23) Kusakabe does not disclose a combiner....

In response, Kusakabe teaches a combiner as he teaches an output means (pp. 2, Para 15) that generates an output image using selected substitute pixel values determined based on a process to reduce noise (pp. 7, Para 113; pp. 8, Para 122-124) using a pixel window (pp. 7, Para 112). Therefore, Kusakabe teaches a combiner....

Applicant argues (pp. 16) Kusakabe's redistribution of noise differs from removing ringing artifacts.

In response, Kusakabe teaches noise detection, where image edges are processed using a LPF (low pass filter) (Para 85-87; Fig. 7). Therefore, it is the interpretation of the Examiner that Kusakabe's noise distribution and processing of edges to reduce blur corresponds to the claimed reduction of ringing artifacts.

With respect to claim 23, Applicant argues (pp. 18) Kusakabe does not disclose detecting ringing pattern like features as a function of gradation level difference between a pixel/s.

In response, Kusakabe teaches identifying a relationship between an edge portion of an image and the LPF processing results used to determine an image state in a pixel window (Fig. 7B; p. 5, Para 85). Kusakabe additionally teaches the LPF processing may be applied to luminance and color difference components (p. 7, Para 109). Applicants specification (pp. 11) identifies a ringing like area is recognized as a weak edge area indicated by a gradation level difference. Therefore, Kusakabe teaches detecting ringing pattern like features as a function of gradation level difference between a pixel.

With respect to claim 24, Applicant argues (pp. 18) Kusakabe does not disclose determining ringing artifact areas by comparing gradation level difference to a threshold.

In response, Kusakabe teaches determining differences of R, G, and B values of selected pixels and comparing the values to predetermined threshold values (pp. 7, Para 105-107). Kusakabe additionally teaches applying luminance and color difference

components in the same manner (pp. 7, Para 109). Thus, Kusakabe fails to specifically disclose "gradation level difference", though it is obvious to include "gradation level difference" with the method of Kusakabe as he discloses alternatively applying the predetermined parameters to the luminance and color difference components.

With respect to claim 26, Applicant argues (pp. 20) Kusakabe does not disclose a smoother.

In response, Kusakabe discloses a LPF and reducing visual artifacts by setting parameters that assure a high noise removal effect when it is determined that the output resolution will introduce blur (p. 6, Para 93). Applicant's Specification (pp. 9) identifies low pass filtered (LPF) picture data is smoothed. Therefore, Kusakabe discloses a smoother as he teaches LPF processing.

With respect to claim 27, Applicant argues (pp. 20, 21 & 24) Kusakabe does not disclose determining local variance of each pixel in the window with respect to neighboring pixels...and a signal detector...

In response, Kusakabe discloses determining the variance of pixels within a window (pp. 7, Para 104-107), where Examiner interprets pixels within a single window as neighboring pixels (Fig. 11). Additionally, Kusakabe discloses a signal detector that detects fi the window location is proximate a noisy area as he teaches a noise removal module that evaluated pixel variance relative to a threshold to determine pixels within noise regions (p. 7, Para 107, 113-114). Therefore, Kusakabe teaches determining

local variance of each pixel in the window with respect to neighboring pixels...and a signal detector...

With respect to claim 30, Applicant argues (pp. 23) Kusakabe does not disclose the input image comprises a decompressed image.

In response, Kusakabe teaches a decoded image suffers block distortion, e.g. noise (p. 1, Para 5). Kusakabe teaches providing an image processing apparatus to suppress deterioration of image information, where the apparatus comprises image input means for inputting image data that contains noise (p. 2, Para 15). Therefore, Kusakabe teaches the input image comprises a decompressed image.

Applicant requests clarification of status of claim 31.

In response, claim 31 is rejected in view of Kusakabe as provided in the previous Office Action; and was inadvertently included with the objected claims.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chante Harrison whose telephone number is 571-272-7659. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on 571-272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Chante Harrison
Examiner
Art Unit 2628

Ch
March 28, 2007

KEE M. TUNG
SUPERVISORY PATENT EXAMINER